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(54) Mechanism and method for focusing remote control input in a PC/TV convergence system

(57) A computer system comprising a computer operable in a computer mode for receiving and transmitting computer information, a television mode for receiving and transmitting television information, and a combination computer/television mode for receiving and transmitting computer and television information. A display is operably associated with the computer for displaying the computer information in the computer mode, the television information in the television mode, and the computer and television information in the computer/television mode. The computer system also comprises at least one television window displayed on the display for displaying the television information, at least one computer window displayed on the display for displaying the computer information, a computer focus for the computer window to control the computer information, and a television focus for the television window to control the television information independently of the computer focus.

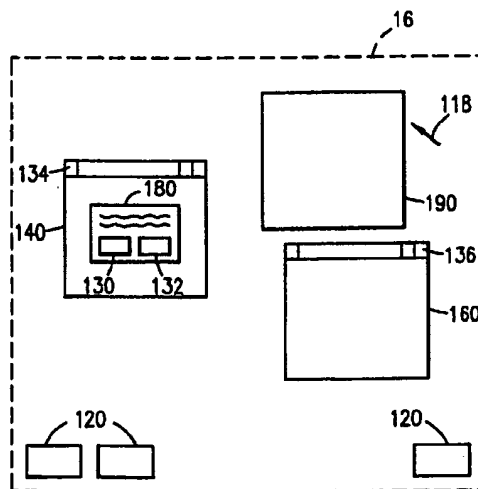


FIG. 3

Description

The present invention relates to a computer convergence system for converging the functionality of a computer with the functionality of a second electronic device such as a television and, more particularly, to a mechanism and method for focusing remote control input in such a computer convergence system.

A personal computer/television (PC/TV) convergence system is a fully functional computer integrated with television functionality, providing TV viewing (via broadcast, cable, satellite, VCR, digital disk, or other broadcast media) and personal computing functionality.

A PC/TV convergence device may comprise a fully functional computer including memory, microprocessors, hard drives, floppy drives, fax-modems, CD-ROM player, keyboard, monitor, power supply, mouse, gamepad/joy stick, microphone, etc. The computer is interfaced with a National Television Standards Committee (NTSC) signal which is converted to a scan "video graphics adapter" (VGA) signal or the computer's scan VGA signal is converted to an NTSC interface signal.

The PC/TV convergence device is controlled by the computer's operating system (OS). Thus, the monitor can display both TV programs and computer applications either at the same time or separately. Furthermore, the convergence of the functionality of a PC and a TV into a single system also permits the utilization of the communications bandwidth, mass storage and graphics application of the computer to deliver, store and display applications within a television viewing environment.

The PC/TV is a user interactive device. For example, if a user is watching TV, the PC/TV will be able to download information from another source (besides a TV station) information about, among other things, the TV program. Such information can originate from a web site or other data sources.

At present, when televisions and personal computers are separate devices, TVs typically incorporate a remote control. A standard TV remote control may control a variety of television functions or other related functions by communicating control information, via, e.g., infrared (IR) signals, to the TV to indicate which button on the remote control was depressed.

Current computer operating systems utilize a graphical user interface displayed on a display having only a single foreground session with which a user may interact, i.e., input control information to it. When converging the functionality of a computer and a television, current computer convergence systems have adopted this single foreground session standard. Presently, a user may control only the computer functions or the television functions, and a TV remote control is rendered inoperative if the foreground session is a computer application. Thus, what is needed is a computer convergence system having a foreground session for television function control and a foreground session for computer function control.

Accordingly, the present invention overcomes the above-identified problems as well as other shortcomings and deficiencies of existing technologies by providing a computer system for converging the functionality of a computer with the functionality of a second electronic device. The computer system comprises a computer operable in a computer mode for receiving and transmitting computer information, a second electronic device mode for receiving and transmitting second electronic device information, and a combination computer/second electronic device mode for receiving and transmitting computer information and second electronic device information. The computer system further comprises at least one input device for communicating control information to the computer to control the operation of the computer. A control mechanism operably associated with the input device to receive the control information is provided for controlling the second electronic device information independent of the computer information.

The present invention also provides a method for controlling the operation of a computer in a computer system comprising a computer that is operable in a computer mode, a television mode, and a combination computer/television mode, and a display operably associated with the computer for displaying in the computer mode computer information, in the television mode television information, and in the computer/television mode computer and television information. The method comprises the steps of providing at least one television window displayed on the display for displaying the television information, providing at least one computer window displayed on the display for displaying the computer information, providing a computer focus for the computer window to control operation of the computer, and providing a television focus for the television window to control the television information independent of the computer focus.

The present invention also provides a computer system comprising a computer operable in a computer mode for receiving and transmitting computer information, a television mode for receiving and transmitting television information, and a combination computer/television mode for receiving and transmitting computer and television information. The computer system also includes a display operably associated with the computer for displaying in the computer mode the computer information, in the television mode the television information, and in the computer/television mode the computer and television information. The computer system further includes at least one television window displayed on the display for displaying the television information, at least one computer window displayed on the display for displaying the computer information, and a computer focus for the computer window to control the computer information. A television focus is provided for the television window to control the television information independent of the computer

focus.

Other advantages, features and characteristics of the present invention, as well as methods, operation and functions of related elements of structure, and the combination of parts and economies of manufacture, will become apparent upon consideration of the following description and claims with reference to the accompanying drawings, all of which form a part of this specification, wherein like reference numerals designate corresponding parts in the various figures, and wherein:

FIG. 1 is a block diagram illustrating a computer system in accordance with the present invention;
 FIG. 2 is a block diagram illustrating an exemplary embodiment of a computer system as illustrated in FIG. 1;
 FIG. 3 illustrates an exemplary graphical user interface according to the present invention; and
 FIG. 4 is a flow control block diagram illustrating a mechanism and method for focusing input in a computer system according to the present invention.

With reference now to the figures wherein like or similar elements are designated with identical reference numerals, there are depicted block diagrams illustrating a method and system according to the present invention. The purpose of these block diagrams is to illustrate the features of the invention and the basic principles of operation of an embodiment thereof. These block diagrams are not necessarily intended to schematically represent particular modules of circuitry or any particular data or control paths.

Referring now to FIG. 1, there is shown a block diagram illustrating a computer system 10. Computer system 10 includes a computer 12, a convergence functionality module 14, a display monitor 16 and a remote input 18.

Computer 12 may preferably be a personal computer, and although not shown in FIG. 1, includes a processor, memory, data retrieval and storage media and communication data ports. Display monitor 16 is operable to receive and display video signals received from computer 12 and may include an audio output system for playing audio signals received from computer 12.

Computer 12 is coupled to convergence functionality module 14 that is operable to receive or generate data signals, such as video, audio, and graphic information. For example convergence functionality module 14 may comprise a television module or receiver, decoder or tuner capable of receiving television information or signals in the form of the National Television Standards Committee (NTSC) or Phase Alteration Line (PAL) forms, from any medium such as from a cable system or from a digital satellite system. Convergence functionality module 14 could also include various other electronic devices such as consumer electronic units. For example, convergence functionality module 14 could also include video gaming units and other direct audio/video sources such as video cassette recorders (VCRs), and video disk player/recorders, including digital versatile disk (DVD) player/recorders.

Computer system 10 may preferably be operated by a user using wireless remote input 18 operating, for example, via radio waves, infra-red waves or acoustic waves. Remote 18 communicates control information to computer 12 and convergence functionality module 14 to control the operation of computer 12 and convergence functionality module 14. Although good results have been achieved using wireless keyboards and remote controls for remote input 18, it is contemplated that any input device, wireless or hardwired, could be used to operate computer system 10.

Still referring to FIG. 1, computer system 10 is configurable to be connected and communicate with a network 20. It is contemplated that network 20 could be any type of network, including a Local Area Network, a Wide Area Network and the Internet.

In general operation, computer system 10 can be operated in various modes. Assuming now that converged functionality module 14 comprises essentially a television module or receiver, computer system 10 can be operated in a computer mode, a television mode, and a combination computer/television mode. Computer system 10 is operable in the television mode and the combination computer/television mode for receiving and transmitting television information. When in a television mode, personal computer 12 processes the audio and video information received or generated by television module 14, and outputs the corresponding information on display monitor 16. At least two viewing surfaces are possible when computer system 10 is being operated in the television mode: a primary viewing surface and a secondary viewing surface. The displayed image of the primary viewing surface fills the entire viewing screen, with only a portion of the screen dedicated to the viewing of the secondary viewing surface, such as a picture-in-picture (PIP).

Computer system 10 is operable in the computer mode and the combination computer/television mode for receiving, storing and transmitting computer information. When computer system 10 is being operated in the computer mode, computer 12 is utilized to perform computer functions, including executing and running software and interfacing with network 20, with the output of computer 12 being displayed on display monitor 16.

When computer system 10 is being operated in the combination computer/television mode, the functionality of computer 12 and television module 14 are both utilized, including simultaneously displaying computer information and the television information on display monitor 16.

Referring now to FIG. 2, there is shown a more detailed block diagram of an exemplary embodiment of computer system 10. Reference numerals used in FIG. 2 which are like, similar, or identical to reference numerals used in FIG.

1 indicate like, similar, or identical components as depicted in this exemplary embodiment.

Computer system 10 includes at least one processor or central processing unit (CPU) 22. CPU 22 is interconnected via system bus 24 to random access memory (RAM) 26; read-only memory (ROM) 28; and input/output (I/O) adapter 30 for connecting peripheral devices such as disk units 32 and tape drives 34 to bus 24; user interface adapter 36 for connecting a hardware keyboard 38, mouse 40 having one or more buttons 42, speaker 44, microphone 46, and/or other user interface devices such as a touch screen device (not shown) to bus 24; communication adapter 48 for connecting computer system 10 to a network 20; and display adapter 50 for connecting bus 24 to display monitor 16. User interface adapter 36 is also adapted to receive control information from remote input 18. Computer system 10 further includes a television module 14 coupled to bus 24 and display adapter 50 for receiving television information from network 20 via communications adapter 48 and providing or transmitting the television information to display adapter 50 for display on display monitor 16.

In the following description, for purposes of explanation, specific program procedures, APIs and configurations are set forth to provide a thorough understanding of the present invention. The exemplary embodiment described herein is implemented with a Windows 95 operating system created by Microsoft Corporation (Windows and Windows 95 are trademarks of Microsoft Corporation) and an Intel Corporation X86 series microprocessor. However, it will be apparent to one skilled in the art that the present invention may be practiced in various computer systems having various processors utilizing various operating systems, and in various configurations or makes or models of tightly coupled processors or in various configurations of loosely coupled multiprocessor systems. Details, procedural descriptions and representations which follow are to convey the substance of the instant invention work to those skilled in the art.

Referring next to FIG. 3, there is illustrated an exemplary graphical user interface (GUI) as displayed on display monitor 16 in accordance with the present invention. The present invention can be implemented either as part of the operating system or as a separate program. The operating system shown in FIG. 3 is Windows 95, but the present invention will work with any GUI. This GUI includes a cursor 118, three icons 120, two computer windows 140, 160, and dialog box 180, all of which are well known in the art. Dialog box 180 contains two buttons 130, 132. Movement of cursor 118 is controlled by mouse 40, keyboard 38, or remote input 18, or any other pointing device, such as a trackball (not shown). When a user moves mouse 40 and/or presses mouse button 42, CPU 10 sends a message to the operating system that a mouse event has occurred. The operating system then processes the message by moving cursor 118 and putting the message in an event queue where it can be examined by interested programs. Programs are represented by the GUI as either icons 120 or computer windows 140, 160. The horizontal region along the top of computer window 140, 160 is called the title bar 134, 136. A computer program window 140, 160 has the focus, i.e., computer focus, when it has been designated by the user or operating system to receive input from any one of the input devices 18, 38, 46, 40. In Windows 95, the user gives a window the focus by clicking mouse button 42 when cursor 118 is inside that window. Some operating systems, however, give a window the focus merely whenever cursor 118 is present within that window. The operating system indicates which program has the focus by changing the color of the focused computer window's title bar 134 or 136. In Windows 95, only one program or computer window has focus at any given time. However, it will be appreciated that two or more computer windows may have focus at any given time. It will also be appreciated that any number of computer windows or icons may be displayed on display monitor 16 at any given time.

In accordance with the present invention, the GUI also includes at least one television window 190 having a border displayed on display monitor 16 for displaying the television information. It will be appreciated that any number of television windows may be used and that each television window may display the same or different television information. For example, a first television window may display a first channel while a second television window may display a second channel, wherein PIP may or may not be utilized. Television window 190 may or may not include a title bar similar to title bars 134, 136. It will be appreciated that, although shown as non-overlapping windows, computer windows 140, 160 and television window 190 may overlap one another wherein, for example, television window 190 is within computer window 140 or partially overlaps with computer window 140, or vice versa. Also, computer windows 140, 160 and television window 190 may be minimized, maximized, or otherwise increased or decreased in size, as is well known in the art.

According to the present invention, the operating system's GUI is modified to include a television focus operably associated with input device 18 and television window 190 for allowing input device 18 to control television information independent of the computer focus for computer windows 140, 160 or any other computer windows. The television focus provides a control mechanism operably associated with input device 18 for receiving the control information communicated to computer 12 to control the television information independent of the computer information.

As will be described in greater detail in connection with the description of FIG. 4, input device 18 includes a plurality of inputs or buttons corresponding to a plurality of television functions, such as channel up, channel down, volume up, and volume down. Thus, as an example, the television focus allows a user to change the volume or channel of television information displayed in television window 190 regardless of computer focus on computer windows 140, 160.

As will be appreciated in connection with the following description for FIG. 4, the present invention provides a system and method for independently controlling two foreground sessions on the GUI depicted in FIG. 3, wherein one foreground session is for controlling television information, and the other foreground session is for controlling computer information.

Referring now to FIG. 4, a flow block diagram illustrating the operation of the present invention is shown. The following can be implemented as part of the operating system or as a separate program.

Remote Control Programming Interface

To receive remote control button press messages or control information, software handlers 212, 214, 216, 218, 220 for controlling television functions corresponding to the button press messages must first register with a routing software module 210 referred to as the RCSP (Remote Control Service Provider) for the buttons they wish to control. For example, software handler 212 may control all channel buttons including channel up and channel down. In this case, software handler 212 would register for or "grab" each channel button pressed. Software handler 214 may control all PIP functions, such as PIP channel control and PIP sizing. Software handler 214 would then register or grab all PIP button presses. Software handler 216 controls all audio or volume control functions and therefore registers for those corresponding button presses, and so on. There are *n* possible software handlers corresponding to *n* television functions. Multiple handlers may register for the same remote button or remote buttons. Once registered, button press messages are received from user interface adapter 36, forwarded to an input software module 205 and forwarded to RCSP 210 to determine which handler 212, 214, 216, 218, 220 receives notification.

While multiple software handlers 212, 214, 216, 218, 220 may wish to be notified of remote button presses, in most cases only a single software handler will ever get notified of a button press. To determine which handler receives notification, RCSP 210 looks through a focus list 222 of software handlers and sends the message to the first handler in the list which is registered for that button.

Software handlers 212, 214, 216, 218, 220 can change their order in the list by calling RCSP 210 to capture focus. A handler may similarly get itself placed at the end of focus list 222 by calling RCSP 210 to release television focus. When focus list 222 is changed, RCSP 210 sends all handlers a message notifying them of the change. If a handler wishes to know which buttons it currently has television focus of, it can request this information from RCSP 210. Button press notifications are sent as messages to the appropriate software handler.

The following provides details on one possible scheme for registering for remote buttons, capturing and releasing television focus, and using the remote button press messages.

Remote Button Press Registration

Before a button press software handler 212, 214, 216, 218, 220 can be notified of button presses, it must first register with RCSP 210. The top-level RCSP 210 interface is a dynamic link library referred to as CPQRCSP.DLL called by the following:

DWORD WINAPI RCSPRegisterButtons(HWND hWnd, BYTE *pbButtons, WORD wButtonCount)
where

hWnd is the window handle for the button press software handler,
pbButtons is a pointer to an array of remote code bytes indicating which buttons are to be registered (see *Remote Control ID Table* below for an exemplary list of buttons and corresponding remote ID codes), and
wButtonCount is a count of the number of buttons in the **pbButtons** array.

The following table describes exemplary remote button codes which may be registered for:

Remote Control ID Table	
Button	Remote Code
RCSP_BUTTON_REV	00h
RCSP_BUTTON_PLAY	01h
RCSP_BUTTON_FWD	02h
RCSP_BUTTON_REC	03h
RCSP_BUTTON_STOP	04h
RCSP_BUTTON_PAUSE	05h
RCSP_BUTTON_1	06h

(continued)

Remote Control ID Table		
	Button	Remote Code
5	RCSP_BUTTON_2	07h
	RCSP_BUTTON_3	08h
	RCSP_BUTTON_4	09h
	RCSP_BUTTON_5	0ah
10	RCSP_BUTTON_6	0bh
	RCSP_BUTTON_7	0ch
	RCSP_BUTTON_8	0dh
	RCSP_BUTTON_9	0eh
15	RCSP_BUTTON_10	0fh
	RCSP_BUTTON_INPUT	10h
	RCSP_BUTTON_ANTENNA	11h
	RCSP_BUTTON_PIP	12h
	RCSP_BUTTON_FREEZE	13h
20	RCSP_BUTTON_CH_CTROL	14h
	RCSP_BUTTON_SWAP	15h
	RCSP_BUTTON_SIZE	16h
	RCSP_BUTTON_VOL_UP	17h
25	RCSP_BUTTON_VOL_DOWN	18h
	RCSP_BUTTON_MUTE	19h
	RCSP_BUTTON_CH_UP	1ah
	RCSP_BUTTON_CH_DOWN	1bh
	RCSP_BUTTON_WHO	1ch
30	RCSP_BUTTON_SKIP	1dh
	RCSP_BUTTON_RESET	1eh
	RCSP_BUTTON_GO_BACK	1fh
	RCSP_BUTTON_CLEAR	20h ²
35	RCSP_BUTTON_GUIDE	21h
	RCSP_BUTTON_TCE_MENU	22h
	RCSP_BUTTON_TCE_INFO	23h
	RCSP_BUTTON_UP_ARROW	24h
	RCSP_BUTTON_DN_ARROW	25h
40	RCSP_BUTTON_RT_ARROW	26h
	RCSP_BUTTON_LT_ARROW	27h
	RCSP_BUTTON_LO_BAT	28h
	RCSP_BUTTON_SAT_CABLE1	37h ¹
45	RCSP_BUTTON_MON_POWER	38h ¹
	RCSP_BUTTON_INTV	39h
	RCSP_BUTTON_VCR1	3ah ¹
	RCSP_BUTTON_AUDIO	3bh
	RCSP_BUTTON_SAT_CABLE2	3ch ¹
50	RCSP_BUTTON_DVD_VCR2	3dh ¹
	RCSP_TV_PC	3eh ¹
	RCSP_BUTTON_POWER	3gh ¹

¹ These are the only buttons which are passed through when the system is in Suspend mode. See the section *Receiving Button Press Messages When System in Suspend Mode* below for more details.

² When this button is pressed, a message is sent to every handler registered for that button, regardless of which handler has television focus for the button.

RCSPRegisterbuttons() returns a DWORD, which is a handler ID identifying a specific software handler. This ID

is used in other RCSP 210 calls to capture or release television focus, deregister buttons, etc. An error value of NULL will be returned if the call failed or if focus list 222 contained invalid button IDs. In the event that an error is returned, none of the requested buttons will be registered.

When a handler successfully registers a button software handler, it will automatically gain television focus of the requested buttons. For an in-depth discussion on gaining and releasing television focus, see the section below titled *Capturing and Releasing Focus*.

Receiving Notification of Button Presses

Button press software handlers will receive the button press message as defined above as notification of a button press.

RCSP_REMOTE_BUTTON_PRESS		
nButtonCode	=(int) wParam;	//button press
IBtnData	=lParam;	//button data

where nButtonCode is the remote ID of the button being pressed (from the *Remote Control ID Table* above), and IBtnData specifies the repeat count and transition-state flag, as follows:

BIT	
0-15	Specifies the repeat count. The value is the number of times the button keystroke is repeated as a result of the user holding down the button or key.
16-30	Reserved; do not use.
31	Specifies the transition state. The value is always 0 if the button is being pressed and 1 if the button is being released.

Note that normally only a single handler will be notified of a single button press. There may be some buttons which may be broadcast to all handlers, i.e., all handlers are notified of the button press. An example of such a broadcast button would be clear, since all handlers are expected to clear windows or other information from display monitor 16.

Capturing and Releasing Television Focus

RCSP 210 maintains focus list 222 of button press software handlers 212, 214, 216, 218, 220 and for each button press determines the proper handler to be notified of the button press (per the RCSP_REMOTE_BUTTON_PRESS message above). To determine the correct handler, RCSP 210 starts at the head of focus list 222 and searches for a handler which has registered for the button which was pressed. The first handler in focus list 222 which is registered for the pressed button, i.e., the handler that has television focus for the pressed button, will receive the RCSP_REMOTE_BUTTON_PRESS message. The handler which receives this message is said to have the television focus for that button. A button press message is normally only sent to a single handler, except as noted above.

When a handler is first registered, it has the television focus for all buttons that it has registered for (since it is placed at the front of the list). However, as additional handlers are registered, the original handler may lose television focus of some of its buttons if new handlers register for those same buttons.

At other times, a button press software handler may have the television focus and wish to release it temporarily to allow other software handlers to process those button press messages. This would normally happen if an application is minimized. When a handler releases television focus, RCSP 210 moves its corresponding node or list entry to the end of focus list 222.

Thus, handlers are able to change their order in focus list 222. To support this, a call RCSPFocusControl() is made, as follows:

```
WORD WINAPI RCSPFocusControl(BOOL bFocus, DWORD dwHandlerID)
```

where bFocus is either RCSP_RELEASE_FOCUS or RCSP_CAPTURE_FOCUS, and dwHandlerID is the ID of the button press software handler, as returned from the call RCSPRegisterButtons(). RCSPFocusControl() returns RCSP_SUCCESS if there is no error, or RCSP_FAILURE if an invalid handler ID is passed in.

When a software handler releases television focus, it should not assume that it will not receive button press mes-

sages. If it is the only software handler registered for a given button, then it will receive these button press messages, which it may simply ignore.

5 Notifying Handlers of Television Focus Change

Whenever a software handler 212, 214, 216, 218, 220 is moved to the front of focus list 222, it is possible that other handlers will no longer receive certain button press messages. Handlers have no way of knowing when they lose television focus in this way unless RCSP 210 notifies them. This notification will take place whenever RCSPFocusControl() or RCSPRegisterButtons() is called to put a new handler to the front of focus list 222. Handlers are also notified when RCSPFocusControl() is called to release television focus, or to RCSPDeregisterButtons() which may bring other handlers into television focus.

This notification takes the form of a message which is posted by the RCSP whenever any of the above circumstances occurs:

RCSP_REMOTE_FOCUS_CHANGE		
Unused	=wParam;	//RCSP_CHANGED_FOCUS
HandlerID	=lParam;	//ID of handler that now has focus

where **HandlerID** is the ID of the software handler at the front of focus list 222. A handler has captured television focus when the HandlerID matches their own, and lost television focus if the HandlerID does not match.

Note that it is not necessary for software handlers to process this message. Most handlers will not need to know when they have lost or gained television focus. A handler can lose television focus but not necessarily lose control of their buttons. For instance, if a new handler registers for the Power button, it will gain television focus even though Power is not a button registered for the current handler. To determine which buttons the handler has registered for, see the RCSPGetButtons function described below.

Button Query

Handlers may call into RCSP 210 to determine what remote control buttons they currently control, or they may wish to determine which buttons a handler currently having the television focus controls as a result of a RCSP_REMOTE_FOCUS_CHANGE message. A button query is made as follows: WORD WINAPI RCSPGetButtons (DWORD dwHandlerID, BYTE *pbButtons, WORD *pwButtonCount);

where **dwHandlerID** is the ID of the handler, as returned from the RCSPRegisterButtons() routine or focus change message,

pbButtons is a pointer to an array of buttons which the handler currently controls, and

pwButtonCount is a pointer to a word containing the number of remote control button codes in the buttons array.

This value should be the maximum number of buttons that can be returned (i.e., the size of the pbButtons array). Upon success, this value will reflect the actual number of buttons returned.

The return values for this call will be as follows:

RCSP_SUCCESS	Command completed successfully;
RCSP_FAILURE	Invalid handler ID.

Simulating Remote Button Presses

It is possible to simulate remote control button presses by calling the RCSP routine WORD WINAPI RCSPSimRemote(BYTE bButton);

where **bButton** is the remote control code as found in the *Remote Control ID Table* above.

The return values for this call will be as follows:

RCSP_SUCCESS	Command completed successfully;
RCSP_FAILURE	Invalid remote control ID.

RCSP 210 will treat this button press as it would if it came from remote control 18; traversing list 222 and posting a message to the first handler registered for that button to simulate button down. Another message will be sent immediately afterwards to simulate button up. In other words, for each call to RCSPSimRemote(), the RCSP will generate two messages: one for button press and another for button release.

Receiving Button Press Messages When System In Suspend Mode

When computer system 10 is in a Suspend mode (i.e., user has turned the unit "off"), no button press messages will be passed through the system except those which cause the system to return from Suspend. These "power" buttons are noted in the *Remote Control ID Table*, above.

Deregistering the Handler

It is very important that a button software handler deregister before closing their application or a handler may no longer wish to receive button press or focus change messages. In either case, the RCSPDeregisterButtons() function can be called: DWORD WINAPI RCSPDeregisterButtons(DWORD dwHandlerID)

where **dwHandlerID** is the ID assigned by RCSPRegisterButtons().

This call returns to following values:

RCSP_SUCCESS	Command completed successfully;
RCSP_FAILURE	Invalid remote control ID.

RCSP 210 also may perform focus list 222 clean-up periodically in order to remove handlers from list 222 which fail to deregister.

Although the invention has been described with a certain degree of particularity, it should be recognized that elements thereof may be altered by persons skilled in the art without departing from the spirit and scope of the invention. One of the embodiments of the invention can be implemented as sets of instructions resident in the random access memory 26 of one or more computer systems configured generally as described in FIG. 2. Until required by the computer system, the set of instructions may be stored in another computer readable memory, for example in a hard disk drive, or in a removable memory such as an optical disk for eventual use in a CD-ROM drive or a floppy disk for eventual use in a floppy disk drive. Further, the set of instructions can be stored in the memory of another computer and transmitted over a local area network or a wide area network, such as the Internet, when desired by the user. One skilled in the art would appreciate that the physical storage of the sets of instructions physically changes the medium upon which it is stored electrically, magnetically, or chemically so that the medium carries computer readable information. The invention is limited only by the following claims and their equivalents.

Claims

1. A computer system for converging the functionality of a computer with the functionality of a second electronic device comprising:

a computer operable in a computer mode for receiving and transmitting computer information, a second electronic device mode for receiving and transmitting second electronic device information, and a combination computer/second electronic device mode for receiving and transmitting computer and second electronic device information;

one or more input devices for communicating control information to said computer to control the operation of said computer; and
control means operably associated with said input device to receive said control information for controlling said second electronic device information independent of said computer information.

2. The computer system, as recited in claim 1, further comprising:

a computer focus for allowing an input device to control said computer information; and
wherein said control means includes a second electronic device focus for allowing an input device to control

said second electronic device information independent of said computer focus.

3. The computer system, as recited in claim 1 or claim 2, wherein said second electronic device mode is a television mode, said combination computer/second electronic device mode is a combination computer/television mode, and further comprising a display operably associated with said computer for displaying computer information in said computer mode, television information in said television mode, and computer and television information in said computer/television mode.

4. The computer system, as recited in claim 3, further comprising, in said combination computer/television mode, at least one television window displayed on said display for displaying said television information, at least one computer window displayed on said display for displaying said computer information, and a computer focus operatively associated with at least one input device and said computer window.

5. The computer system, as recited in claim 4, wherein said control means includes a television focus operably associated with said television window for allowing an input device to control operation of said television information independent of said computer focus.

6. The computer system, as recited in claim 1, wherein at least one input device includes a plurality of inputs corresponding to a plurality of second electronic device functions and wherein said control means comprises:

software handlers for controlling said plurality of second electronic device functions;
at least one second electronic device focus operably associated with said software handlers for allowing one of said plurality of inputs to control said second electronic device functions; and
routing means for determining, in response to a selected one of said plurality of inputs, which one of said software handlers has said second electronic device focus for said selected one of said inputs.

7. The computer system, as recited in claim 6, wherein a first software handler has said second electronic device focus for a first one of said inputs and a second software handler has said second electronic device focus for a second one of said inputs.

8. The computer system, as recited in claim 6 or claim 7, wherein said routing means includes a focus list of said software handlers for indicating which one of said software handlers has said second electronic device focus for said selected one of said inputs.

9. The computer system, as recited in claim 8, wherein said routing means includes means for updating said focus list by changing which one of said software handlers has said second electronic device focus for said selected one of said inputs in response to requests from said software handlers.

10. The computer system, as recited in claim 8 or claim 9, further comprising means for registering or de-registering said inputs to or from said software handlers and wherein said routing means includes means for updating said focus list by changing which one of said software handlers has said second electronic device focus for said selected one of said inputs in response to registering or de-registering of said inputs.

11. The computer system, as recited in claim 6, wherein said routing means includes notification means for notifying said software handlers of any changes to said focus list.

12. The computer system, as recited in claim 1, wherein an input device is one or more software programs.

13. The computer system, as recited in claim 1, wherein an input device is a remote control device.

14. A method for controlling the operation of a computer in a computer system having a computer operable in a computer mode, a television mode, and a combination computer/television mode, and a display operably associated with said computer for displaying computer information in said computer mode, television information in said television mode, and computer and television information in said computer/television mode, the method comprising:

providing at least one television window displayed on said display for displaying said television information;
providing at least one computer window displayed on said display for displaying said computer information;
providing a computer focus for said computer window to control said computer information; and

providing a television focus for said television window to control said television information independent of said computer focus.

15. The method, as recited in claim 14, further comprising:

5 providing at least one input device for communicating control information to said computer wherein said input device includes a plurality of inputs corresponding to a plurality of television functions; providing software handlers for controlling said plurality of television functions; and determining, in response to a selected one of said plurality of inputs, which one of said software handlers has said television focus for said selected one of said inputs.

16. The method, as recited in claim 15, further comprising:

15 providing a focus list of said software handlers for indicating which one of said software handlers has said television focus for said selected one of said inputs.

17. The method, as recited in claim 16, further comprising:

20 updating said focus list by changing which one of said software handlers has said television focus for said selected one of said inputs in response to requests from said software handlers.

18. A computer system comprising:

25 a computer operable in a computer mode for receiving and transmitting computer information, a television mode for receiving and transmitting television information, and a combination computer/television mode for receiving and transmitting computer and television information;
a display operably associated with said computer for displaying in said computer mode said computer information, in said television mode said television information, and in said computer/television mode said computer and television information;
30 at least one television window displayed on said display for displaying said television information;
at least one computer window displayed on said display for displaying said computer information;
a computer focus for said computer window to control said computer information; and

35 a television focus for said television window to control said television information independent of said computer focus.

19. The computer system, as recited in claim 18, further comprising:

40 at least one input device for communicating control information to said computer wherein said input device includes a plurality of inputs corresponding to a plurality of television functions; software handlers for controlling said plurality of television functions; and routing means for determining, in response to a selected one of said plurality of inputs, which one of said software handlers has said television focus for said selected one of said inputs.

45 20. The computer system, as recited in claim 19, further comprising a focus list of said software handlers for indicating which one of said software handlers has said television focus for said selected one of said inputs.

50 21. The computer system, as recited in claim 20, wherein said routing means includes means for updating said focus list by changing which one of said software handlers has said television focus for said selected one of said inputs in response to requests from said software handlers.

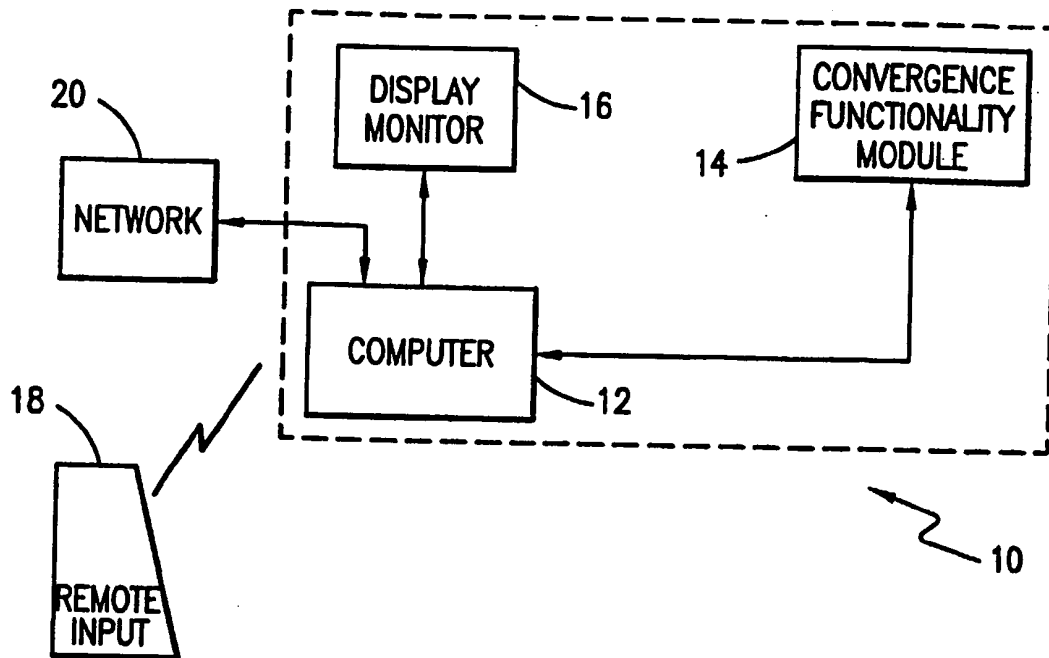


FIG. 1

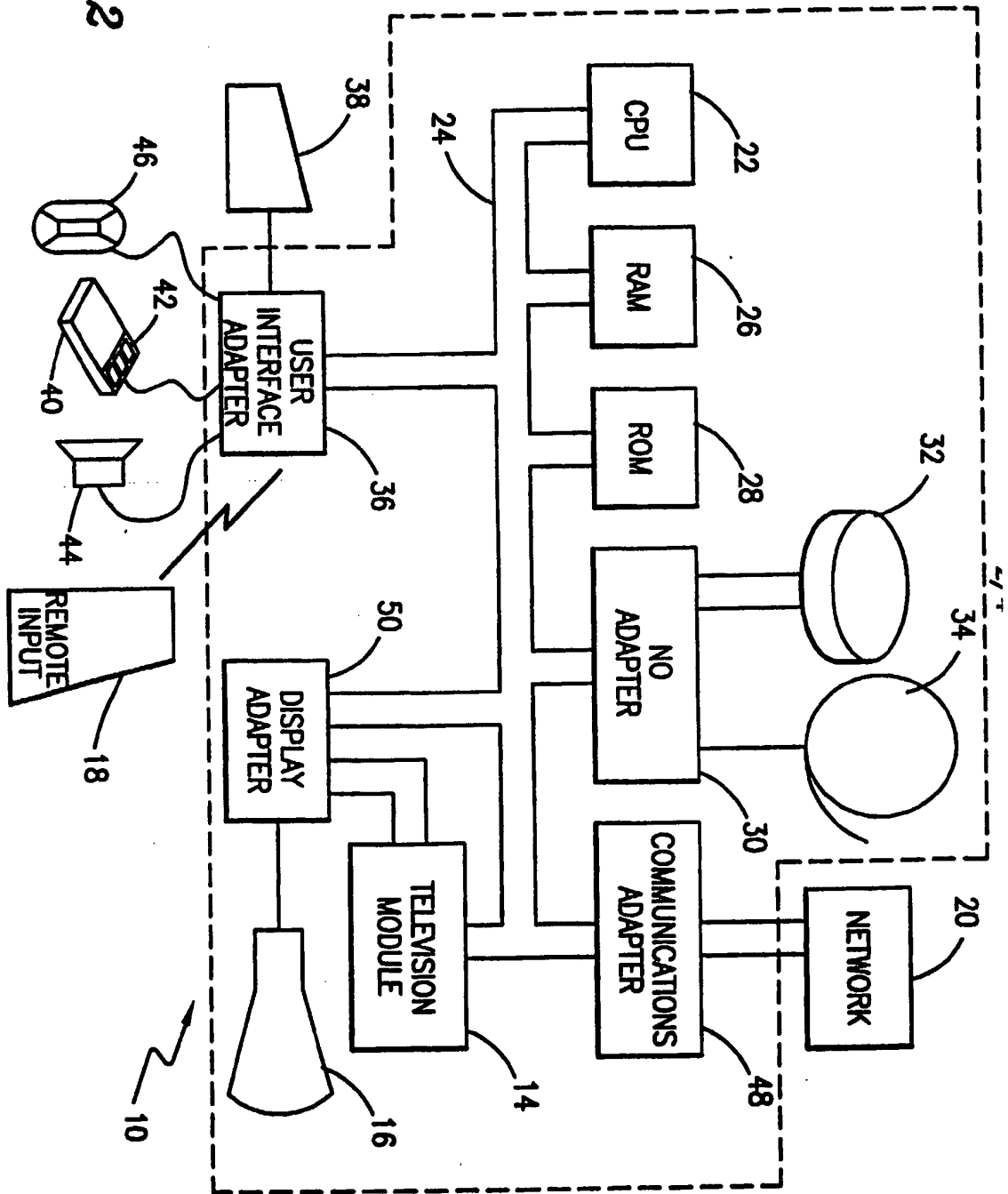


FIG. 2

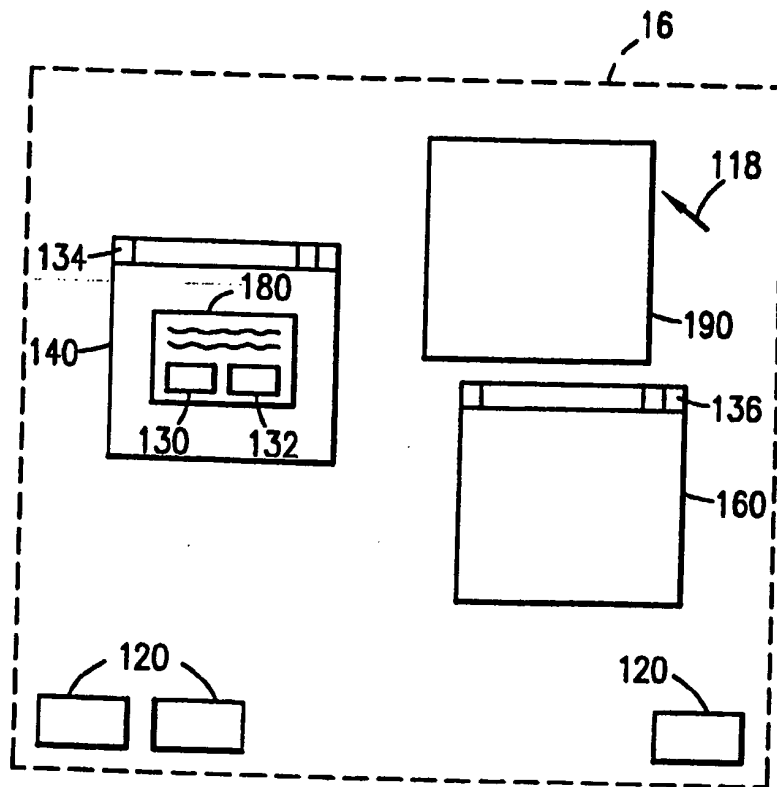
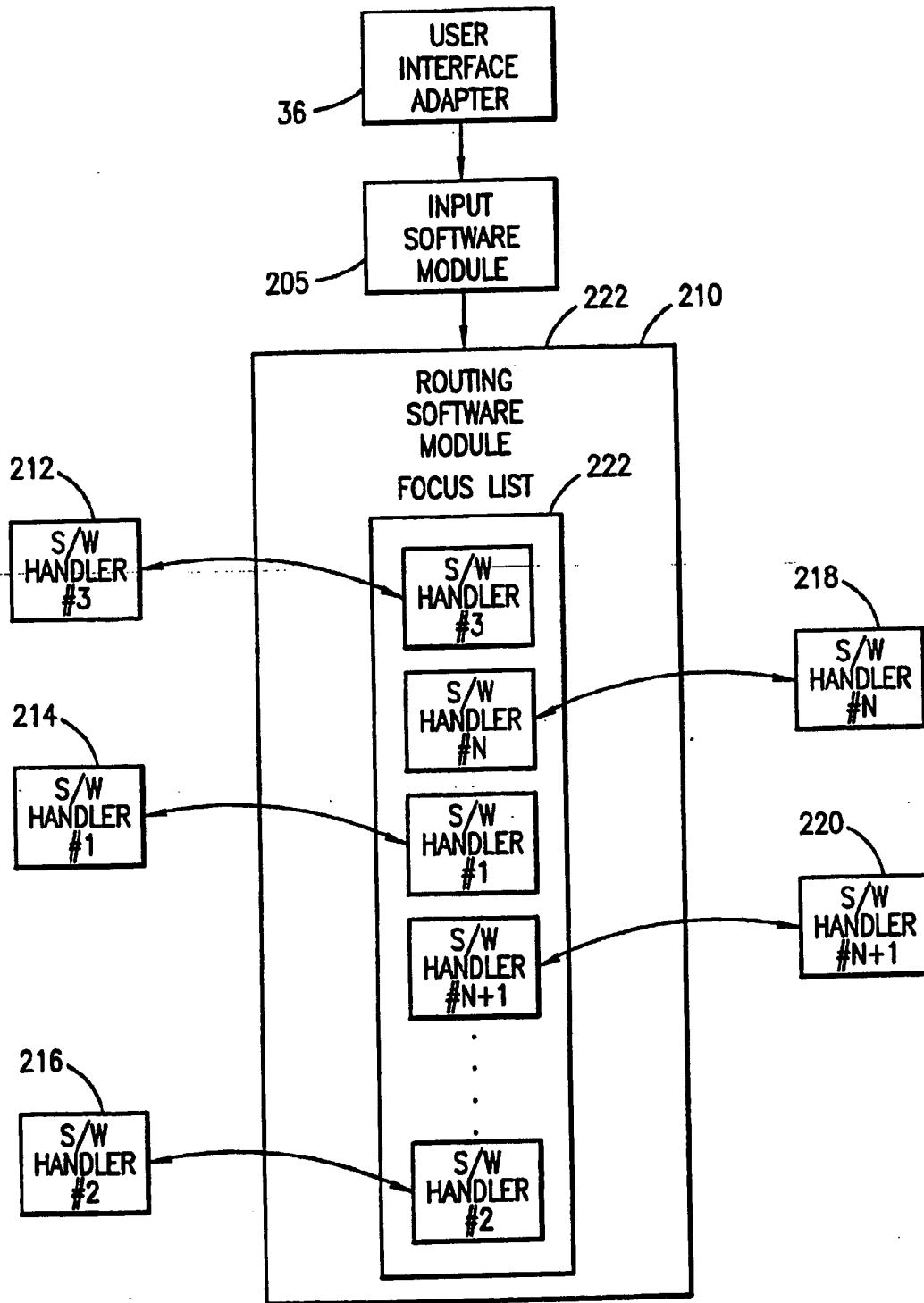
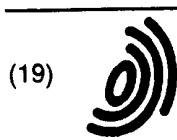


FIG. 3

**FIG. 4**

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(54) **Mechanism and method for focusing remote control input in a PC/TV convergence system**

(57) A computer system comprising a computer operable in a computer mode for receiving and transmitting computer information, a television mode for receiving and transmitting television information, and a combination computer/television mode for receiving and transmitting computer and television information. A display is operably associated with the computer for displaying the computer information in the computer mode, the television information in the television mode, and the computer and television information in the computer/television mode. The computer system also comprises at least one television window displayed on the display for displaying the television information, at least one computer window displayed on the display for displaying the computer information, a computer focus for the computer window to control the computer information, and a television focus for the television window to control the television information independently of the computer focus.

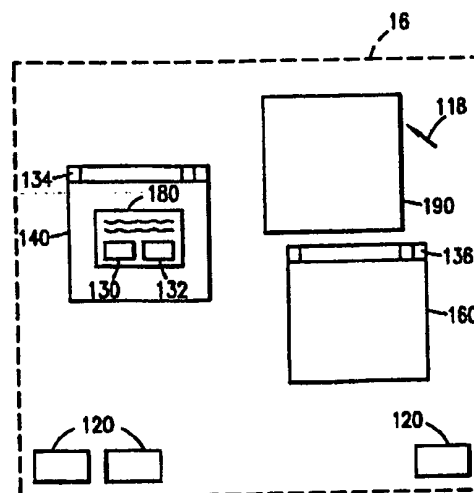


FIG. 3



European Patent
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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
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The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 5 October 1999	Examiner Durand, J
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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